**Stem Cells in Lung Cancer**

## Grant Award Details

Stem Cells in Lung Cancer

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| **Grant Type:** | New Faculty II |
| **Grant Number:** | RN2-00904 |
| **Project Objective:** | The overall goal of this grant is to characterize proximal airway epithelial cell stem cells in injury or diseased states, and to identify the cell of origin in lung squamous cell carcinoma. |

**Investigator:**

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| **Name:** | Brigitte Gomperts |
| **Institution:** | University of California, Los Angeles |
| **Type:** | PI |

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| **Disease Focus:** | Cancer, Lung Cancer, Respiratory Disorders, Solid Tumors |
| **Human Stem Cell Use:** | Adult Stem Cell, Cancer Stem Cell |
| **Award Value:** | $2,381,572 |
| **Status:** | Closed |

## Progress Reports

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| **Reporting Period:** | Year 1 |
| **View Report** | |

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| **Reporting Period:** | Year 2 |
| **View Report** | |

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| **Reporting Period:** | Year 3 |
| **View Report** | |

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| **Reporting Period:** | Year 4 |

**View Report**

**Reporting Period:**    Year 5

**View Report**

**Reporting Period:**    NCE (Year 6)

**View Report**

## Grant Application Details

**Application Title:**    Stem Cells in Lung Cancer

**Public Abstract:**    Lung cancer is the most deadly cancer worldwide and accounts for more deaths than prostate cancer, breast cancer and colon cancer combined. Non small cell lung cancer (NSCLC) accounts for about 85% of all lung cancers. The current 5-year survival rate for all stages of NSCLC is only 15%. Although early stage lung cancer has a much better survival rate. Current therapeutic strategies of chemotherapy, radiation therapy and trials with new targeted therapies have only demonstrated, at best, extension in survival by a few months. Clearly, a novel approach is required to develop new therapies for this devastating disease and to detect the disease at an early stage. Cancer stem cells have been identified as the initial cell in the formation of carcinomas. Chemotherapy, radiation and even targeted therapies are all designed to eliminate dividing cells. However, cancer stem cells "hide out" in the quiescent phase of growth. This provides an explanation as to why our cancer therapies may produce an initial response but are often unsuccessful in curing patients. Lung cancer develops through a series of step wise changes that result in the progression of pre-malignant lesions to invasive lung cancer. The mechanisms of how lung cancer develops are not known and if we can prevent the formation of pre-malignant lesions, we will likely be able to prevent lung cancer. We have discovered a subpopulation of stem cells that circulates in the blood and is essential for normal lung repair. Blocking these cells from entering the lung results in a pre-malignant condition in the lungs. We have also identified a subpopulation of stem cells in the lung that is responsible for generating pre-malignant lung cancer lesions. We hypothesize that the interaction between the stem cells in the blood and the stem cells in the lung are critical to prevent lung cancer. We plan to use cutting edge technologies to characterize these different stem cell populations in the lung, and determine how they form pre-malignant lung cancer lesions. We also plan to use preclinical models to try to prevent lung cancer by giving additional stem cells derived from the blood as a therapy. Lastly, we plan to determine whether levels of stem cells in the blood in patients may be used as a blood test to measure the chance of recurrence of lung cancer after therapy. The long term goals of our work are to develop a screening test for lung cancer stem cells that can predict which patients are at high risk for developing lung cancer in order to diagnose lung cancer at an early stage, and to potentially develop a new stem cell based therapy for preventing and treating lung cancer.

**Statement of Benefit to California:** According to the Center for Health Statistics, California Department of Health Services, 13,427 people died of lung cancer in the state of California in 2005. This is more than the deaths attributed to breast, prostate and colon cancers combined. The devastating effects of this disease on the citizens of California and the health care costs involved are enormous. Most cases of lung cancer occur in smokers, but non smokers, people exposed to second hand smoke and ex-smokers are also at risk. In addition, of special concern to California residents, is that exposure to air pollution is associated with an increased risk of lung cancer. Current therapeutic strategies for lung cancer are in general only able to prolong survival by a few months, especially for late stage disease. One reason for this may be that the cancer initiating stem cell is resistant to these therapies. Understanding the stem cell populations involved in repair of the lung and how these cells may give rise to lung cancer is important for potentially generating new therapeutic targets for lung cancer. We propose to study the stem cell populations of the lung that are crucial for normal airway repair and characterize the putative cancer initiating stem cell in the lung. We have also found stem cells in the blood that are critical for normal airway repair and we plan to test their role in the prevention of premalignant lung cancer lesions. We also plan to test whether levels of these stem cells in the blood may be used as a biomarker of lung cancer. Ultimately, the ability to perform a screening test to detect lung cancer at an early stage, and the development of new therapies for lung cancer will be of major benefit to the citizens of California.

**Source URL:** https://www.cirm.ca.gov/our-progress/awards/stem-cells-lung-cancer